

***Case Study:
Improving a
Style-Based ETF Portfolio
Using Individual Stocks***

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Executive Summary

A reader submitted an ETF portfolio, asking for suggestions on how this could be improved. The gist of the question was how to use the Quantext Monte Carlo portfolio planner to improve the asset allocation. This portfolio is allocated fairly generically:

Ticker	Style	Allocation
IWB	Large Cap	35%
IWR	Mid Cap Blend	10%
IWM	Small Blend	5%
ADRE	Emerging Markets	5%
IEV	European Stock	10%
EPP	Pacific Stock	10%
EWC	Canada iShares	5%
IDU	US Utilities Index	10%
IGE	Natural Resources	5%
ICF	REIT	5%

I entered the portfolio and allocations into the portfolio simulation model and the software tabulated historical data for the past three years on the ETF's and developed parameters for simulating forward based on the long-term balance between risk and return in stocks and bonds. Using the parameters, the Monte Carlo model projected an average annual return of 10.9% per year for this portfolio, with a standard deviation in annual return (SD) of 16% (relative to the projected SD for the S&P500 of 15.1%). The portfolio Beta is almost exactly 100%. While this portfolio is 'diversified' from the perspective of style (large cap, medium cap, small cap, emerging markets, Euro markets, Pacific, energy, real estate), it is not particularly well diversified in terms of using portfolio offsets to manage risk.

By re-balancing funds among these ETF's, the projected return improved by 1.35% per year, with the same level of total portfolio SD and a Beta of about 94%. The real improvements came, however, when we added allocations to individuals stocks from companies for which fundamentals are not closely coupled to the returns in the broader market. By allocating part of the portfolio into insurance, health care and waste management stocks, the final portfolio yielded projected average annual return of 13.85%, with lower projected SD than the market as a whole and the original portfolio. The final portfolio is shown below:

Ticker	Percentage of Funds
IWB	10.0%
IWR	5.0%
IWM	5.0%
ADRE	10.0%
IEV	5.0%
EPP	5.0%
EWC	5.0%
IDU	10.0%
IGE	10.0%
ICF	5.0%
WTU	5.0%
XL	5.0%
AET	5.0%
UNH	5.0%
ALL	5.0%
WCN	5.0%

Introduction

A reader recently emailed me a question about allocations in an ETF portfolio using a Monte Carlo planning model. Upon looking at the portfolio, suggested that this portfolio would make an interesting case study. The basic case is a substantial portfolio to be invested entirely in stock. There is another half of the portfolio in bonds that are managed separately that the reader wanted to ignore for the time being. The investment time horizon is ten years with no additional monies to be added. The reader's goal was to develop a diversified portfolio with low fees that would generate an attractive risk-return profile.

The Basic Portfolio

The initial portfolio that the reader submitted was a fairly typical example of a generic broad-based allocation:

Ticker	Style	Allocation
IWB	Large Cap	35%
IWR	Mid Cap Blend	10%
IWM	Small Blend	5%
ADRE	Emerging Markets	5%
IEV	European Stock	10%
EPP	Pacific Stock	10%
EWC	Canada iShares	5%
IDU	US Utilities Index	10%
IGE	Natural Resources	5%
ICF	REIT	5%

To be perfectly accurate, the initial portfolio included a number of ETF's with very short histories and we had to substitute similar ETF's with longer histories. All of the ETF's above have at least three years of data.

When we entered the base portfolio (above) into the Quantext Portfolio Planner, and ran the Monte Carlo using three years of market data, the analysis and projection suggested that the portfolio was essentially a market proxy in terms of risk, but with recent returns substantially greater than the market as a whole (see table below). This is quite typical---most people tend to look more closely at sectors that have been outperforming recently.

Portfolio Stats	
Average Annual Return	Standard Deviation (Annual)
10.94%	16.01%
Historical Data	
Start: 1/1/2003	End: 12/31/2005
Average Annual Return	Standard Deviation (Annual)
22.32%	10.04%
Historical Beta: 99.99%	
Performance of S&P500 over historical period	
Average Annual Return on S&P500 13.40%	
Annual Standard Deviation on S&P500 8.97%	

The Monte Carlo projection (above) suggests that the future average annual return on this portfolio will be 10.94% per year, with a standard deviation of 16.01% per year. To obtain these results, we assumed that the future average annual return and standard deviation of the return on the S&P500 would be 8.3% and 15.07%, respectively. This is a conservative estimate. The portfolio has a Beta of 100%, with a higher standard deviation in returns than the S&P500, so it is reasonable that this portfolio would yield an annual return greater than the S&P500. This gain of 2.7% per year in average return is largely attributable to broad allocation. It is worth noting that over the most recent three years, this portfolio dramatically out-performed the S&P500 (see above: 22.3% vs. 13.4%). It is worth noting how the Monte Carlo projection yields a much smaller advantage than recent history.

Re-Balancing the Original Portfolio

There are many ways that this portfolio could be improved and we experimented with changing the allocations between these ETF's to improve results with the constraint that total portfolio volatility (measured by Standard Deviation in returns) will not increase. The new and improved allocation has less focus on ETF's by market cap and more focus on specific sectors:

Fund Name	Percentage of Funds	Average Annual Return
IWB	10.0%	8.43%
IWR	10.0%	9.99%
IWM	5.0%	14.18%
ADRE	5.0%	16.77%
IEV	10.0%	12.03%
EPP	10.0%	10.58%
EWC	5.0%	13.58%
IDU	15.0%	10.77%
IGE	15.0%	15.05%
ICF	15.0%	14.17%

The projected average annual returns (above) provide some basis for understanding how the re-balancing improves the portfolio, but the fact that real estate, energy, and natural resources have low Betas is a substantial factor:

Fund or Stock Ticker	Beta	Standard Deviation (Annual)
IWB	101%	15%
IWR	112%	18%
IWM	156%	27%
ADRE	159%	32%
IEV	125%	23%
EPP	84%	20%
EWC	108%	26%
IDU	66%	20%
IGE	82%	29%
ICF	71%	27%

The chart above shows historical Beta and projected Standard Deviation in annual returns.

This re-balanced portfolio shows the following results after having been run through the Monte Carlo projections:

Portfolio Stats	
Average Annual Return	Standard Deviation (Annual)
12.29%	15.98%
Historical Data	
Start:	End:
1/1/2003	12/31/2005
Average Annual Return	Standard Deviation (Annual)
25.29%	10.45%
Historical Beta: 93.51%	

The projected annual return shows an increase of 1.35% per year and the projected Standard Deviation in return is just slightly lower—though so close as to be indistinguishable. This portfolio shows considerably higher exposure to energy and real estate. It is worth noting that none of the Betas on these ETF's are particularly low, with the lowest contributions being from energy. This is one of the consequences of using broad-based ETF's.

Adding Individual Stocks

One of the easiest ways to manage risk and return in this portfolio is to add individual stocks to the portfolio. For purposes of simplicity, I have looked at just a few sectors: health care, insurance, and energy. After some consideration and analysis, I came up with the following stocks to add to the mix:

Ticker	Name
WTU	Williams Coal Gas
XL	XL Capital
AET	Aetna
UNH	UnitedHealth Group
ALL	Allstate
WCN	Waste Connections Inc.

These stocks were chosen because they are in industries that have fundamental reasons why they would tend to be out of sync with the market as a whole. Insurance (property & casualty and personal lines), health care, and waste management are substantially driven by forces that are distinct from systematic market risk. Even though energy stocks as a

whole are well represented, WTU is included as a way to look at the relative contribution of a single company as compared to an ETF.

In developing the final portfolio, I assumed that the reader had some interest in maintaining exposure to each of the sector ETF's in the original portfolio. I also assumed that the first target would be to increase return, while keeping portfolio risk at or below the initial level. The inclusion of the individual stocks will help in risk management because of the low Betas associated with these stocks. If we look at the longest history available for this group of stocks (limited by WCN to start with June 1998), the Beta of an equally-weighted portfolio among these stocks is 43%.

			Portfolio Stats	
Fund Name	Percentage of Funds	Average Annual Return	Average Annual Return	Standard Deviation (Annual)
IWB	10.0%	8.43%	13.85%	15.01%
IWR	5.0%	9.99%		
IWM	5.0%	14.18%		
ADRE	10.0%	16.77%	Historical Data	
IEV	5.0%	12.03%	Start:	End:
EPP	5.0%	10.58%	1/1/2003	12/31/2005
EWC	5.0%	13.58%	Average Annual Return	Standard Deviation (Annual)
IDU	10.0%	10.77%	25.69%	10.31%
IGE	10.0%	15.05%	Historical Beta: 88.78%	
ICF	5.0%	14.17%		
WTU	5.0%	22.33%	Performance of S&P500 over historical period	
XL	5.0%	15.47%	Average Annual Return on S&P500	
AET	5.0%	22.23%	13.40%	
UNH	5.0%	14.19%	Annual Standard Deviation on S&P500	
ALL	5.0%	14.78%	8.97%	
WCN	5.0%	12.20%		
-	0.0%	8.30%		
-	0.0%	8.30%		
-	0.0%	8.30%		
-	0.0%	8.30%		
Sums to	100.0%			

This portfolio is projected to return an average of 13.85% per year (2.9% per year more than the original portfolio), with lower standard deviation in annual return than the original portfolio. Over the last three years, this portfolio has generated returns far higher than the S&P500, albeit with higher total volatility.

Conclusions

This portfolio is not presented as an optimal portfolio, but rather as a way to suggest improvements to the original portfolio. Given the ten-year investment horizon, we can easily look at the outcomes. The final tuned portfolio is projected to have a median value of \$2.3M and a 20th percentile value of \$1.4M in ten years. The original portfolio is projected to have a median value of \$1.8M and a 20th percentile value of \$1.0M in ten years. The final portfolio is projected to raise the median value of the portfolio at the same time as it raises the 20th percentile substantially.

There are many other companies that could be chosen for the purpose of portfolio management. These are simply choices that I have come up with. I have not analyzed the fundamentals of these companies. The principal merits of these stocks is that they have tended to show returns that are largely uncorrelated to the movements of the overall market and for which the fundamentals of the overall business models are generally not in sync with the overall market.

The value of a Monte Carlo simulation tool is that it allows the user to examine portfolio effects between components. Everyone understands that bonds, despite have lower average returns than stocks, improve the total portfolio because of risk offsets. What most investors do not fully understand is how to quantify similar risk offsets among asset classes and individual assets. Any given analyst may disagree with the projected average annual return on any given asset or asset class. This is why average annual return can be adjusted up or down from the numerically computed level. The Monte Carlo model is simply intended to provide a baseline from which to examine portfolio effects and the long-term costs of bearing volatility in a portfolio.